

## REPORT DOCUMENTATION PAGE

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6. AUTHOR(S) Prof. Ervin Y. Rodin		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Center for Optimization and Semantic Control Dept of Systems Science and Mathematics, Campus Box 1040 Washington University St. Louis MO 63130-4899		8. PERFORMING ORGANIZATION REPORT NUMBER
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**PROGRESS REPORT**  
(October 1, 1996-September 30, 1997)

Submitted to  
Air Force Office of Scientific Research  
Building 410, Bolling AFB, DC 20332

by

Ervin Y. Rodin, P.I.  
Professor and Director

Center for Optimization and Semantic Control  
Department of Systems Science and Mathematics  
Campus Box 1040, Washington University  
One Brookings Drive  
St. Louis, MO 63130-4899

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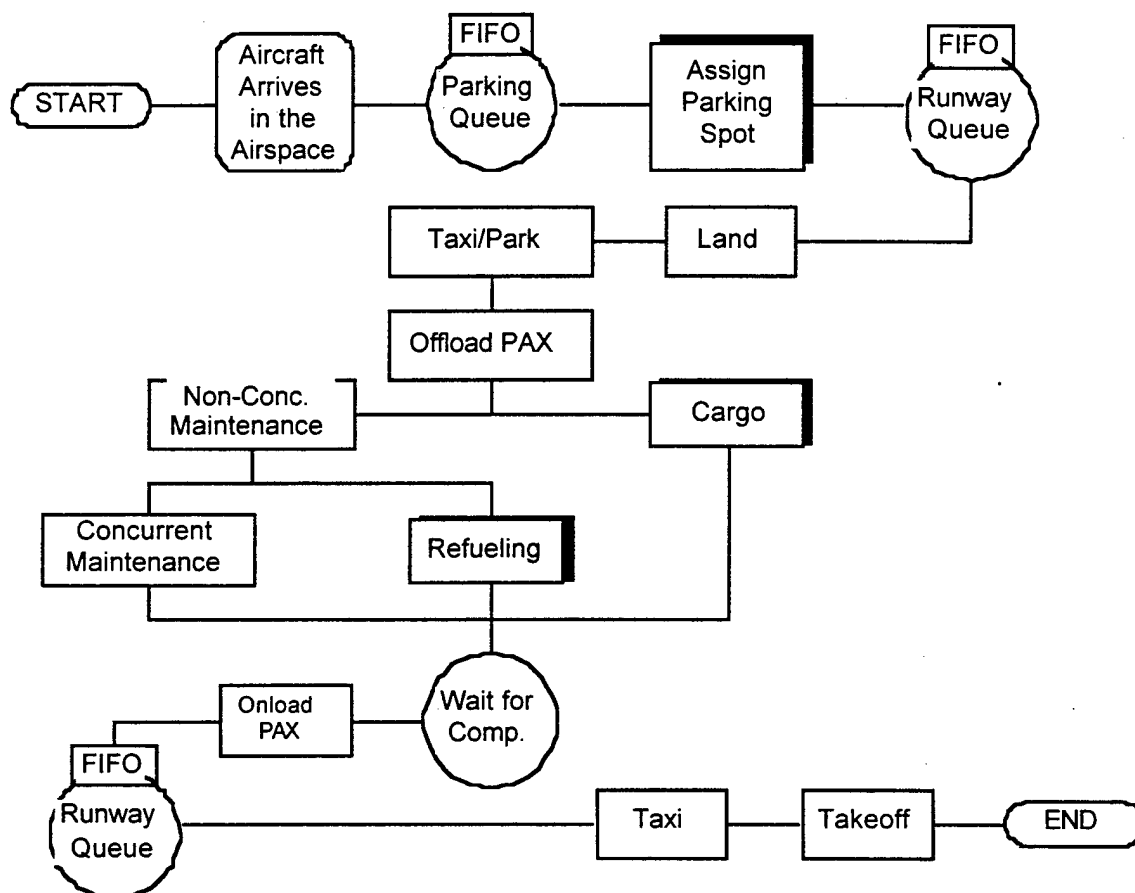
Grant AFOSR F49620-96-1-0332

**VALIDATION OF BASE RESOURCE AND CAPABILITIES ESTIMATION  
(BRACE)**

30 August, 1997

BRACE can be run with internally generated aircraft arrival streams. The simulation currently supports six types of aircraft (C-130, C-17, C-5, C-141, B-747, DC-8), each with a different set of definable cargo and fuel requirements. The user can specify any proportion of these six aircraft which will subsequently be chosen by use of a uniform random variable. The inter-arrival times between aircraft can be drawn from either an exponential or triangular distribution with user-specified parameters.

**AIRCRAFT SERVICE SCHEDULE:** Each aircraft simulated in BRACE follows a schedule of activities which require interaction between the various resources provided by the airfield. From the aircraft point of view, every activity during the simulation is analogous to waiting in a queue for an available server and subsequently obtaining service from an airfield resource. The following chart outlines the possible service requirements in the proper sequence.



When an aircraft arrives in the simulation, it enters a first in first out (FIFO) queue which assigns parking spots to aircraft. After being assigned a parking spot, the aircraft requests use of the runway and waits in a FIFO queue until the runway resource becomes available. After the aircraft lands,

it taxis to the assigned parking spot where it will receive service from the airfield resources.

**Simulation Results:** A simulated pallet movement operation requires the coordination of aircraft, k-loaders, docks, and forklifts which clear pallets from the docks to the cargo yard. Replacing the entire movement operation with the time delay models, developed during the last year, results in a significant decrease in computational time for the simulation. In one test case where each aircraft required five k-loader loads of pallets, a 500 aircraft simulation ran faster by a factor of eight with the time delay function replacing the pallet on-load part of the simulation. The equations developed accurately capture the time delay as seen by an aircraft for loading and fueling service at an airfield.

## **5. PERSONNEL ASSOCIATED WITH THIS RESEARCH**

### **Faculty:**

Professor Ervin Y. Rodin (PI)

### **Graduate Student:**

Travis Cusick

## **6. PUBLICATIONS**

None as yet

## **7. INTERACTIONS/TRANSITIONS**

Joint development with HQ/AMC at Scott AFB.

**"The Base Resource and Capabilities Estimation (BRACE) Project,"**  
Presentation at the Mobility Simulation Users' Group Workshop,  
Daytona Beach, Florida, March 1997

## **8. NEW DISCOVERIES, INVENTIONS OR PATENT DISCLOSURES**

None

## **9. HONORS/AWARDS**

None